



GRASSROOT MECHANIZED FARMING: THE ROLE OF AGRICULTURAL EXTENSION PROVIDERS

Ayotunde Olayinka Owolabi

Department of Agricultural Economics & Extension Landmark University, Omu-Aran,
Nigeria

Ayorinde Ebenezer Kolawole

Department of Agricultural Economics & Extension Landmark University, Omu-Aran,
Nigeria

Abiodun Oladayo Ajala

Department of Agricultural Economics & Extension Landmark University, Omu-Aran,
Nigeria

Adebola Jones Akangbe

Department of Agricultural Economics & Extension Landmark University, Omu-Aran,
Nigeria

Kayode Samuel Obaniyi

Department of Agricultural Economics & Extension Landmark University, Omu-Aran,
Nigeria

Adeola Temitope Adebimpe

Department of Agricultural Economics & Extension Landmark University, Omu-Aran,
Nigeria

Vitoria Adeniyi

Department of Agricultural Economics & Extension Landmark University, Omu-Aran,
Nigeria

ABSTRACT

The paper focused on the role of extension service providers in ensuring that mechanization is adopted at the grassroot level among farmers. Information dissemination, farmers' education and awareness creation in motivating the smallholder farmers to utilizing these farm machineries optimally plays a major role in

actualizing mechanized farming among these farmers. It further highlights the various challenges hampering the operational use of these farm machines by farmers such as cultural barriers, high cost of machines, low access to credit facilities, high cost of rental, lack of technical expertise among others. It offers practical guide to solving these barriers for optimum use of these farm machines by grassroot farmers through the assistance of extension personnel in creating awareness, and educating the farmers into embracing farm mechanization, sustaining their interest as regards introduction of one technology per time, need specification, technical know-how, action and satisfaction. All of these will help in improving mechanization effectively at the grassroot level with the assistance of extension personnel.

Keyword: Agricultural Extension, Mechanization, Extension Service Providers, Farmers.

Cite this Article: Ayotunde Olayinka Owolabi, Ayorinde Ebenezer Kolawole, Abiodun Oladayo Ajala, Adebola Jones Akangbe, Kayode Samuel Obaniyi, Adeola Temitope Adebimpe and Vitoria Adeniyi, Grassroot Mechanized Farming: the Role of Agricultural Extension Providers, International Journal of Civil Engineering and Technology, 10(02), 2019, pp. 176–182

<http://www.iaeme.com/IJCIET/issues.asp?JType=IJCIET&VType=10&IType=02>

1. INTRODUCTION

Mechanized farming might have been adopted by large scale farmers in Africa but its spread to the grassroot appears to have been impeded by several factors. It has been established that farming by rural people contributes significantly to food sustainability within Africa. Most large-scale farmers produce for industries that process agricultural produce for other uses apart from daily food. Cassava could be processed to make starch for industrial purposes. Palm kernel could be processed as oil to be used in soap making and several other uses. The farmers at the grassroot however focus majorly on producing their crops for sale on market days and this has been found to significantly contribute to consistent food availability in families. It is however challenging that majority of these farmers age fast due to exertion of power in the process of cultivation, thereby reducing their level of productivity as they increase in age. The young ones also lose interest in farming as they see the level of depreciation in the older ones due to manual approach to farming.

The immense benefit of mechanization in agriculture cannot be overemphasized as it contributes significantly to increased food production and the entire value chain. Mechanization of agriculture entails substituting machinery for human power expended on farm activities for fast, less stressful and increased output in the farming process. In ideal environments, farmers are expected to use tractors, harvesters, boom sprayers, planters, power drillers, slashing machines, riggers and single axle multipurpose machine. Compared to human labour, machines are expected to have optimum productivity. In essence, the land preparation, soil testing, planting, weeding, application of fertilizer, irrigation, crop protection, harvesting and all post-harvest activities, processing and marketing could be mechanized (Breuer, Brenneis & Fortenbacher, 2015).

However, the level of mechanization in African farming system has been estimated to be at the lowest rung of the ladder of agricultural development (Kirui & Braun, 2018). Small sale farmers do not have the wherewithal to acquire machineries that have the capacity to improve their agricultural produce and this keeps them at the lowest level of productivity. This invariably limits them to subsistence farming. It has been reported by Food and Agricultural

Organization that the decrease in the use of tractor since it peaked in 1986 has been on consistent downward trend as less than two tractors per 1000 ha are available for cultivation of arable lands (FAO, 2012).

1.1. Nigeria and the Current State of Agricultural Mechanization

Use of farm machinery at small scale level in Nigeria is at a very low level (Olaoye & Rotimi, 2010). The original intention of the government and leadership of the agricultural sector has been to popularize the use of machineries to facilitate agricultural practice through indigenous mechanization and this led to the formation of the National Centre for Agricultural Mechanization (NCAM). The essence of this Centre is to oversee manufacturing of farm tools, the standardization and certification of agricultural tools, machines and equipment in Nigeria, as well as testing and evaluating the suitability of all types of imported and locally developed agricultural tools, machines and equipment already in use and those proposed to be used in Nigeria (Anazodo, 1980). The impact of this Centre is a subject to be investigated as it does not appear that the essence has been considerably achieved.

Material and human resources are expedient in agricultural sector and Nigeria has abundance of these (UKAID, 2012). Nigeria is reported to have over 163 million population (NBS, 2012) which constitute her human resources in agricultural and non-agricultural sectors. An estimated 92.4 million hectares of land could be accounted for as being suitable for production of crops. It has been found by Federal Ministry of Agriculture and Natural Resources that yearly cultivation takes just a minimum of 32 million hectare of the available arable land in Nigeria (FMANR, 2010) and out of the 79 million hectares, only about 32 million hectare is usually cultivated (FMANR, 2010). It therefore holds that underutilization of available lands in Nigeria may not be unconnected with dependence on human power to cultivate the land.

Poverty level in Nigeria has continued to be on the increase despite the fact that 80% of Nigeria's population engages in Agriculture (Dauda, Musa and Ahmad, 2012). This realization establishes the fact that the practice of agriculture in Nigeria is not given the right approach which is mechanization. The rate of food exporting in Nigeria is high despite the fact that higher percentage of Nigeria's population engages in agriculture (FAO, 2013). The level of migration from the rural areas to urban areas has also increased as youths do not see the prospect of agriculture majorly done through manual process (NPC, 2006).

It is envisaged that if mechanization is given priority in Nigeria, the level of involvement of youths in agriculture may assume an upward trend. The need for farmers to engage the use of machines becomes paramount as this has very high potential to enhance agricultural productivity (FAO, 2008). Unlike Nigeria that has over 80% of her population engaged in agriculture, America has about 24% and the level of productivity in agriculture far exceeds that of Nigeria as 95% of her agricultural activities are mechanized (Indian Ministry of Agriculture, 2013). Mechanization therefore occupies a strategic position in the agricultural sector.

Food production could be significantly boosted if mechanization is given the attention it deserves (Akande, 2009). The need to migrate from manual operations as regards farming had been canvassed by Dauda, Agidi and Shotunde (2010), explaining that yields accruable from mechanization supersede those from manual labour and that the inability of local farmers to meet the need of the growing population will continue to be more conspicuous. Food sufficiency in Nigeria may therefore not be achievable if mechanization is not given priority (Olayanju, Clinton, Ojediran, Alake, Okunola, Alhassan, Olaniran and Idahosa, 2018; Okonkwo, Olaniran, Ojediran, Olayanju, Ajao & Alake, 2018). Access to tractors at very subsidized rate becomes necessary as this is a major tool for land clearing and ridges making

(Maharjah & Cheltin, 2006; Ishola and Adeoti, 2004). Tractor has been lauded as being synonymous with mechanisation (NAERLS and NPFS, 2011). Several achievements in the agricultural sector have been related to the use of tractors. Nigeria however does not presently have required number of tractors that could be engaged by the generality of farmers. Most of these tractors are available to large scale farmers. Farmers at the grassroot are reported to be struggling to make ends meet. Although tractor was introduced to Nigeria in the 1950s, its impact has not been so significant (Dauda et al 2010).

1.2. Impediments to Grassroot Agricultural Mechanization

It has been observed that there are impediments to mechanization of agricultural activities in Nigeria, especially the rural area where small-scale farmers are predominant. Some of these challenges could be traced to socio-cultural factors, behavioral issues, poverty, neglect, poor maintenance culture and other deep-rooted challenges. Access to farm machines is limited and sometimes non-existent due to poverty level of farmers in the rural community. High cost of rent, purchase and maintenance are major issues being battled by farmers in rural areas. Farmers at the grassroot who are supposed to be helped by government do not have adequate information on loans.

It is also considered inefficient to mechanize small parcel of land as the cost of production may be higher than the proceeds from the yield. Farm mechanization may also be hindered through poor electricity distribution at the grassroot level, poor road network, lack of technical personnel that could help in repair of machines. Level of literacy among rural dwellers also constitutes another challenge to use of agricultural machines. Focus on the oil sector at the expense of farming is a major factor that has plagued the agricultural sector and this affects the commitment of the government to investment in agricultural facilities such as machines (Faleye, Adebija & Farounbi, 2012).

1.3. Agricultural Extension Providers, Small Scale Farmers and Mechanization

The aim of agricultural extension is to dispense useful information to farmers for knowledge updating, acquisition of skills, change of attitude and capacity building in the use of technological devices and machines for optimum agricultural productivity (Rahim, 2008; 2010). Ultimately, extension services are created for the sole purpose of communication on new innovations, government policy, country situation and general conditions that will improve the welfare of farmers and reduce loss in the business of agriculture. Agricultural extension agents are adjudged as the link between the farmers and other stakeholders in agriculture (Idiegbeyan-Ose, Owolabi, Segun-Adeniran, Aregbesola, Owolabi & Eyiolorunshe, 2018).

Ensuring adoption of mechanization at the grassroot has a lot to do with agricultural extension officers and their competence with respect to the intermediary role they play between farmers and government as well as private organizations that relate with farmers for several reasons. Some of the major activities of extension agents include timely information dissemination to farmers, organizing of training, educating farmers through farmers field schools, providing assistance in operational use and repair of machines by linking farmers with professionals and several other tasks (Zwane 2012; Bitzer 2016).

2. APPROACHES BY EXTENSION PRACTITIONERS IN ENSURING GRASSROOT ADOPTION OF MECHANIZATION

It is expedient that extension providers motivate rural farmers towards adoption of new technologies to boost their farm yields. A strategic plan is inevitable as farmers may not be favorably disposed to new ways of doing things. They may even tie change to taboo, stating

that their tradition does not permit use of other technology apart from what their forefathers used in the past. Much more, financial requirements may be a significant limiting factor. Some of the ways to motivate them include:

- I.** Attention: This can be initiated by creating awareness, educating farmers and rendering adequate support to them through the extension personnel known as 'Subject Matter Specialists' (SMS) designated for agricultural engineering purpose in extension organisations. Efforts should be directed at ensuring that farmers are given maximum support, understanding and encouragement to change their perspectives in relation to the new and improved way of farming. Education on the benefits of mechanization should be given to farmers. How to get financial assistance from government and private organizations should be clearly communicated. Where and when necessary, extension service providers should assist them in filling forms and carrying out some administrative processes to facilitate ease of acquiring loans.
- II.** Interest sustenance: Extension personnel should ensure they counsel persons involved in deploying new technologies not to bombard farmers at the grassroot with 'too much innovations' as this may confuse them. One machine should be introduced per time and farmers should be allowed to get used to such machine by technically showing them how to operate it before another is introduced. This will help farmers in sustaining interest and encourage duplication of efforts as they mobilize other farmers into adopting or using these machines.
- III.** Need specification: It is the duty of extension service provider to know the need of a particular community and the kind of technology that will satisfy such needs. When a specific machine meets the desire of farmers, the extension personnel is able to recommend these machines or assist in getting it for them if it requires rentage. As a result, it becomes easier for them to quickly adopt such machines for their farming purposes.
- IV.** Technical know-how: The confidence level of farmers needs to be built over a period of time. Skill acquisition programmes should be organized to give them the boldness to try their hands on the machines. When they are convinced that they are able to operate the machine, the rate of adoption increases and ultimately impacts on their level of productivity.
- V.** Action: Appreciating the performance of farmers as they use the machines encourages them to intensify their efforts in the same direction and they will also encourage others to use the machines. Conscious and intentional actions must be taken by extension practitioners at ensuring that farmers continuously use the machines available for agricultural processes.
- VI.** Satisfaction: The level of satisfaction of farmers with the technology should also be measured by extension service providers. This can be determined by weighing the benefit achieved with the use of these farm machines over the manual use or outdated machines used in time past. It is this process that will confirm if the machine has met the desire of the farmers. This may lead to the need of introducing a better machine or maintain the status quo as the case warrants.

3. CONCLUSION

Agricultural extension providers are major agents that should relate with all other disciplines as they are the link between the farmers and other organizations that may want to deploy new

technologies or new ways of doing things. Agricultural engineers need to collaborate with extension personnel as this will help them to penetrate the farmers and drive the use of machines in agricultural practices. The extension service providers take on the role of teachers, motivators and crusaders for change, hence the need to carry them along by other sectors relating with local farmers. It is anticipated that through steps highlighted in this paper, extension personnel should be able to promote mechanized farming at the grassroot level in a way that will ensure a continuous and optimum utilization.

ACKNOWLEDGEMENTS

The authors sincerely thank the management of Landmark University for full sponsorship of this research work.

REFERENCES

- [1] Akande, L.O. Effects of agricultural mechanization on environmental management in Nigeria: An overview, *Journal of Pure Science. Science Education*. 4(2), 2009, pp. 101-118.
- [2] Anazodo, U. G. N. Agricultural mechanization as a catalyst for rural development. Paper presented at the national seminar on achieving even development in Nigeria. Economic Development Institute, University of Nigeria, Enugu Campus.1980.
- [3] Bitzer, V. Incentives for enhanced performance of agricultural extension system. (Kit Working Paper. (6), 2016. www.kit.nl/sed/publications
- [4] Breuer, T., Brenneis, K. & Fortenbacher, D. Mechanisation – a catalyst for rural development in sub-Saharan Africa. *Rural* 21. 49(2), 2015, pp.16–19.
- [5] Dauda, S.M., Agidi G. and Shotunde M. A. Agricultural tractor ownership and off season utilization in Ogun State, South Western Nigeria, *African Journal of General Agriculture*, 6(3), 2010, pp. 95-103.
- [6] Dauda, S.M., Musa J. and Ahmad. Mechanization effect on farm practices in Kwara State, North Central Nigeria. *Journal of Engineering*. 2(10), 2012, pp. 79-84.
- [7] Faleye T., Adebija J.A. & Farounbi A.J. Improving small-farm productivity through appropriate machinery in Nigeria. *International Research Journal of Agricultural Science and Soil Science*. 2(9), 2012, pp. 386-389. <http://www.interestjournals.org/IRJAS>.
- [8] FAO/UNIDO. Agricultural mechanization in Africa: Time for action, planning Investment for enhanced agricultural production. Report of an expert group meeting, Food and Agriculture Organization of the United Nations, Rome. 2008, pp. 1-36.
- [9] FAO. FAO Statistical Yearbook 2012: Africa Food and Agriculture. Food and Agriculture Organization of the United Nations Regional Office for Africa Accra, Ghana. 2012, <http://www.fao.org/docrep/018/i3137e/i3137e.pdf>
- [10] FAO. Rice Market Monitor, - Trade and Market Division, Food and Agriculture Organization of the United Nations, Rome, XVI (2), 2013, pp. 1-36.
- [11] Federal Ministry of Agriculture and Natural Resources (FMANR). National Agriculture Investment Plan 2011-2014, ECDWAP/CAADP/Process, Federal Ministry of Agriculture and Natural Resources, Nigeria, 2010, pp. 1-80.
- [12] Idiegbeyan-Ose, J., Owolabi, A., Segun-Adeniran, C., Aregbesola, A., Owolabi, S.E. & Eyiolorunshe, T. (2018). Information provision by public library to agricultural extension agents in a developing country. *Public Library Quarterly*. 2018, DOI: 10.1080/01616846.2018.1555412.

- [13] Ishola, T.A. & Adeoti J.S. (2004). A study of farm Tractors Reliability in Kwara State of Nigeria, proceedings of the annual Conference of the Nigerian Institution of Agricultural Engineers , Kwara State, Nigeria November 28- December 2, 2004. (proc. NIAE): 26, 2004.
- [14] Kirui, O.K. & Braun, J.V. Mechanization in African agriculture: a continental overview on patterns and dynamics. ZEF Working Paper Series, Center for Development Research, University of Bonn. 2018, <http://www.zef.de/workingpapers.html>
- [15] NAERLS and NPFS. Agricultural performance survey of 2011 wet season in Nigeria. National Report. National Agricultural Extension and Research Liaison Services and National Programme for Food Security, Federal Ministry of Agriculture and Rural Development, Nigeria. 2011, pp. 1-175.
- [16] NBS, Gross domestic product for Nigeria (2011 and Q1 2012). Plot 762, Independence Avenue, Central Business District, Abuja Federal Government of Nigeria, National Bureau of Statistics, Nigeria. 2012, pp. 1-15.
- [17] Maharjan, K.L., and Cheltri A.K. Household food security in rural areas of Nepal: Relationship between socio-economic characteristics and food security status. Paper presented at the international Association of Agricultural economics Conference. Gold Coast, Australia, 2006, pp.12-26.
- [18] Okonkwo, C. E., Olaniran, A., Ojediran, J. O., Olayanju, T. A., Ajao, F., & Alake, A. S. Design, development, and evaluation of locust bean seed dehuller. *Journal of Food Process Engineering*, 2018, e12963. <https://doi.org/10.1111/jfpe.12963>.
- [19] Olaoye, J. O. & Rotimi, A. O. (2010). Measurement of agricultural mechanization index and analysis of agricultural productivity of farm settlements in Southwest Nigeria. *Agri. Eng. Int: The CIGR J.* 12(1), 2010, pp. 125-134
- [20] Olayanju, T.M.A., Clinton, E.O., Ojediran, J.O., Alake, S.A., Okunola, A.A., Alhassan, E.A., Olaniran, A. Idahosa, E.O. *International Journal of Mechanical Engineering and Technology (IJMET)*, 9 (11), 2018, pp.769-778. Article ID: IJMET-09_11_078.
- [21] UKAID. Gender in Nigeria Report 2012: Improving the lives of girls and women in Nigeria: issues, policies, action, British Council Nigeria. (2), 2012, pp. 1-99.
- [22] Zwane, E. M. Does extension have a role to play in rural development? *South African Journal of Agricultural Extension*, 40 (1), 2012, pp.6–12.